
PART VIII.

THE SPANISH MACKEREL FISHERY.

By R. EDWARD EARLL.

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1. THE FISHING GROUNDS.

Spanish mackerel may be taken with trolling-books along almost any portion of the Atlantic coast between Key West, Florida, and Long Island, New York; but as this method of fishing is practically restricted to a few localities the troll-line catch is quite unimportant. Enough are caught, however, to show that the species occurs, and to indicate that the fishing grounds may be considerably extended in the future.

Professor Goode states, upon the authority of Thaddens Norris, that in the Gulf of Mexico they are sometimes taken by means of hook and line with shrimp bait, at the ends of the long piers where the steamboats land in going from Mobile to New Orleans, and that they are so abundant on the Gulf coast of Florida, as to be shipped in considerable numbers from Cedar Keys. Since the statement by Mr. Norris, a careful study of the fisheries of the Gulf has been made by Mr. Silas Stearns, of Pensacola, Fla., under the direction of the United States Fish Commission and the Census Office. The reports forwarded by him lead us to believe that, whatever may have been the catch of the past, that of 1880 was so small as to be of little commercial importance, though this is perhaps due to a lack of suitable apparatus of capture rather than to any scarcity of the mackerel.

Off the eastern coast of Florida a few are landed by a smack fishing for the Savannah market. Off Charleston small numbers are secured by the crews of the vessels employed in the blackfish fishery, who claim to see occasional schools of mackerel, and think that in case they should make a practice of fishing for them considerable quantities could be secured.

On the North Carolina coast there are no summer vessel fisheries, and but few boats fish along the outer shore, none using methods suited to catching the mackerel. Parties fishing with seines along the inner bays caught few of these fish prior to 1879. During this season they are said to have been quite plenty for a short time, and many were taken by the fishermen, who, being unacquainted with the species, did not recognize its value, and, instead of saving their mackerel, threw the greater part of them away. Some, however, were taken to Wilmington, but the dealers refused to purchase them, thinking them to be a species of horse mackerel, which they supposed to be of little value for food.

Chesapeake Bay has by far the most extensive fishery for Spanish mackerel in the United States; the other fisheries, in order of importance, being those of Sandy Hook, Southern Long Island, and Narragansett Bay. Few are taken on the southern coast of New Jersey, as little fishing is done along the outer shore. Some are, however, secured by the vessels trolling in the

vicinity of Barnegat Inlet, and the menhaden fishermen of Tuckerton occasionally catch them in their purse-seines.

The commercial fishery is of recent origin, and it is only within the past few years that any considerable quantities have been taken for market. The fishery practically began off the New Jersey coast in 1873, and the mackerel were first extensively taken in Chesapeake Bay in 1875. This fact has little or no significance in its bearing upon the abundance of the fish, for the increased catch is almost wholly accounted for in both localities by the change in the methods of fishing.

2. APPARATUS AND METHODS OF CAPTURE.

Three kinds of apparatus are used in the Spanish mackerel fishery, namely, the troll-line, the gill-net, and the pound-net. The troll-line is more extensively employed off the Long Island coast and along the shores of Northern New Jersey than in any other locality. It was introduced into the region at an early date, and for some time was the most important method in the fishery. It has been less extensively used during the past ten years, and is now chiefly employed by parties fishing several miles from the shore. Large open boats and small sloops, carrying from two to five men each, are used for trolling. The trolling-hooks, or "squids," as they are frequently called, differ greatly. Some are made of bright metals in the form of a fish, while others more nearly resemble the body of a squid, these being usually painted in brilliant colors. The number of hooks varies from one to three according to the kind of squid used. In the absence of a manufactured squid the fishermen frequently improvise very good ones by attaching a piece of red or white cloth to ordinary fish-hooks. In fishing, the hooks are attached to lines several fathoms in length, four or five of these being towed behind the boat, which spreads enough canvas to drag them through the water at a speed of two to four miles per hour. The fishermen are often successful in catching large numbers of mackerel in this way.

At Sandy Hook gill-nets were first employed in the capture of mackerel in 1866, but being "set tant," they were not very successful, the fish usually detecting their presence and refusing to enter them. When it was found that, although abundant, the fish did not gill readily, schools of them were often surrounded by the nets, after which the fishermen attempted to frighten them into the meshes by splashing with oars in the center of the circle. The majority, however, would pass under the lead-lines, or jump over the cork-lines, and escape, so that comparatively few were taken. Still the nets continued to be used with varying success, though the bulk of the catch was taken by trolling. About 1872 or 1873 it was accidentally discovered that the mackerel would gill more readily in nets set in such a way as to present sharp angles, quite a number having been secured in a net that had become twisted and tangled by the currents. This fact suggested a change in the manner of setting, and various experiments were made by the fishermen of Seabright with good results. The first "sets" were somewhat crude, but experience enabled the fishermen to improve upon them from year to year.

The figures in the accompanying illustration represent the principal methods of setting the gill-nets for the capture of Spanish mackerel off Sandy Hook from 1866 to the present time. Fig. 1 shows the first method, locally known as the "straight-set." The other figures represent, in their order, the more important methods that have since been introduced. At the present time the nets are set in pairs, and the three "sets" shown in Figs. 6, 7, and 8 are most commonly employed.

These are locally known as the "square-set," "T-set," and "harpoon-set," the names describing, to a certain extent, the shape of the nets as they appear in the water. In the square-set, Fig. 6, one of the nets is placed perpendicular to the shore to form a leader, while the other is set in the form of a square at the outer end, openings of 3 or 4 feet being left on either side of the

leader to allow the fish to enter. The T-set, shown in Fig. 7, somewhat resembles the one already described, the chief difference being that the ends of the outer net, instead of being bent at right angles, are turned inward to form a triangle at the outer extremity of the leader. In the third set, Fig. 8, the two nets are so arranged as to form a harpoon, from which the set takes its name.

The gill-nets of this region are worth from \$90 to \$100 apiece. They are about 100 fathoms long and 100 meshes deep, the size of the mesh varying from $3\frac{1}{2}$ to 4 inches. The men fish in "gangs," one net being owned by the crew of each boat. The nets are set on the best fishing grounds at daybreak, and are left for several hours, while their owners fish with hand-lines in the vicinity. The catch is divided equally, the share for a single net being sometimes as high as \$1,000 for a season, which lasts from six weeks to two months.

Gill nets were introduced into the Spanish mackerel fisheries of Chesapeake Bay in 1877, and proving fairly successful, they soon came into general favor among the fishermen of the Eastern Shore, though they are even now seldom employed by those living on the opposite side. There are at present about one hundred and seventy-five men engaged in "gilling" for mackerel between Crisfield, Md., and Occohannock Creek, which is 30 or 40 miles from the capes. The nets were at first set only in the night, but during 1880 the fishermen of Tangier Island obtained the best results by fishing from the middle of the afternoon until midnight. The nets range from 75 to 100 fathoms in length, and have a similar mesh to those already mentioned. The catch varies considerably, as many as 500 mackerel having been taken at one set, though the average is only 20 to 40 to the net.

The pound net is now the principal apparatus for the capture of mackerel in all localities where the fishery is extensively prosecuted. According to Mr. R. B. Chalker, of Saybrook, Conn., pound-nets were first used in the fisheries of New England at Westbrook, Conn., in 1849, and from that locality they spread rapidly to other portions of the coast. They were first introduced at Sandy Hook, N. J., by Mr. George Snediker, of Gravesend, Long Island, about 1855. Mr. Snediker has probably done more to develop the pound-net fisheries of the United States than any other man in the country. It was from him that the fishermen of New Jersey, as well as those of Chesapeake and Delaware Bays, obtained their first idea of pound-nets, he being the first to introduce them into the fisheries of each of these regions. He has also engaged in the pound-net fisheries of Albemarle Sound, though he cannot claim the credit of introducing the net into those waters.

The first pounds fished in New Jersey were very small, and, being placed along the inner shore of Sandy Hook, they were hardly a success, as the fish are much less abundant there than along the outer shore. The same style of pounds were, however, fished with varying success until about 1873, when larger ones were placed along the ocean shore; and then, for the first time, their importance in connection with the Spanish mackerel fishery was discovered. The majority of the mackerel secured about Sandy Hook are now taken in this way. One hundred fish in number was considered an average daily catch for the fishing season of 1879, and 100 to 140 for 1880, though much larger catches were occasionally secured. The best day's fishing for a pound-net in that locality occurred in the summer of 1879, when Mr. Robert Potter took 3,500 pounds, valued at \$700, at a single lift.

An effort was made as early as 1858 by Captain Henry Fitzgerald to introduce the pound-net into the waters of Chesapeake Bay, but his net was not properly constructed, and was so unsuccessful that it was soon taken up. No other attempt was made to fish with pound-nets in this region until about 1870, when Mr. Snediker and Charles Doughty, of Fairhaven, N. J., came to the region, and located on the banks of the James River a few miles above its mouth. They fished chiefly for shad and alewives, continuing their work for about three years, after which they

disposed of their property and returned to the North. In 1875 Mr. Snediker went to New Point, Va., and built a large pound in the waters of Mobjack Bay for the capture of shad and other species. The fishermen of the neighborhood, being wholly unacquainted with the pound-net, were very jealous of the stranger that came among them with such destructive apparatus. They watched Mr. Snediker's movements closely for several weeks, and, after seeing the enormous quantities of fish taken by him, at once informed him that he must take his "traps" and leave the country. Refusing to comply with their demands, a number of them sawed off the stakes of the pound even with the water and carried the netting to the shore, assuring Mr. Snediker that if he attempted to put it down again they would destroy it. Seeing it was useless to continue the fishery here, he decided to seek some more favorable locality. Before leaving he sold the stakes that remained in the water to a resident fisherman, who obtained from them a pattern of the pound, and in a short time had one properly arranged for fishing. This was also destroyed by the fishermen, but not until enough had been learned to convince them that pound-nets could be used with great profit, and within a year from that time 12 pounds were fished in Mobjack Bay. In 1879 the number had been more than doubled, and on our visit to the region in 1880 we found that every available site was taken up, and often three, or even four, nets were placed in line, the leader of one being attached to the outer end of another, for the purpose both of economizing space and of securing the fish that chanced to be passing at a distance from the shore.

Mr. Snediker, on leaving New Point, proceeded to the eastern shore of the Chesapeake, and associated with himself one of the most popular fishermen of the region, hoping in this way to prevent any organized opposition on the part of the resident fishermen against the use of the pound. By this means he was successful in avoiding any open hostilities, and it was not long before others became interested in the use of pounds. Though the pound-net was introduced into the Chesapeake against the prejudice of the fishermen, it has entirely revolutionized the fisheries of Virginia. Prior to 1870 the fisheries of the region were of little importance, the business being largely in the hands of the farmers, who fished with hand-lines and drag-seines for a few weeks in the spring and fall, their chief object being to secure a supply of fish for themselves and their neighbors; while to-day the Chesapeake is the center of one of the most important shore fisheries in the United States. The pound-net has not only more than doubled the catch of ordinary fishes, but it has brought to the notice of the fishermen many valuable species that were previously almost unknown to them, the most important of these being the Spanish mackerel. In 1880 162 pounds were fished in Virginia waters, with two others located at Crisfield, Md., just above the Virginia line.

As the pound-net is such an important apparatus in the Spanish mackerel fishery, a brief description will not be out of place. In the accompanying diagram, Fig. 9 represents the particular kind of net used on the shores of Northampton County, Virginia. All pounds are constructed on a similar principle, though they differ considerably in size and shape in different States. Few are provided with pockets, and many have only one heart.

The leader and hearts are vertical walls of netting, extending from the surface to the bottom, and simply answer the purpose of directing the fish into the pound, which has not only sides, but also has a bottom made of netting, there being but one opening (A B) through which the fish can enter or escape. This opening is rectangular in shape, it is about 3 feet wide, and extends from top to bottom, the netting being so arranged that the aperture can be entirely closed before the pound is lifted. The poles M, N, A, C, D, &c., to which the netting is attached, are from 4 to 8 inches in diameter, each being driven from 5 to 8 feet into the mud or sand of the bottom by means of a maul or pile driver.

The hearts and bowls are placed in water 15 to 18 feet. From these the leader extends to within a few yards of the shore. It varies greatly in length, according to the slope of the bottom, the average being about 150 fathoms. The netting is of ordinary material, with a 3-inch stretch-mesh. The hearts are made of stouter twine, having a mesh of $2\frac{1}{2}$ inches. The opening to the "Big Heart" is 25 feet across, while that to the "Fore Bay" is only 8 feet. The pound or bowl is a rectangular inclosure 45 by 60 feet. The netting of which it is composed is of heavier material than that used for either the leader or the hearts, the mesh being an inch from knot to knot. The pocket is simply a bag of netting, 15 to 30 feet square and 6 to 8 feet deep, in which the fish are placed when, for any reason, it is found desirable to keep them alive for some time before marketing them. In many localities where the bottom is level or slopes very gradually two, three, or even four pounds are placed in a line, one outside of the other, in order to intercept any fish that may be swimming beyond the reach of the first one. The fish, striking the leader in their migrations along the shore, at once attempt to swim around it by going into deeper water, and are naturally lead through the hearts into the pound, their habit of moving in curves rather than by angular turns making their escape quite difficult. If, however, the pound becomes well filled with fish and they are allowed to remain in it for a considerable time some of them succeed in finding the opening A B, and others soon follow them into the inner heart, from which they find less difficulty in escaping. It is known that many fish pass out in this way, for large quantities are sometimes seen in the pound before the hauling time arrives, which, when the net is lifted a few hours later, are found to have made their escape. Another proof that the fish often escape from the nets is found in the fact that nets fished twice a day will stock a third or a half more than those that are visited but once in twenty-four hours. In properly constructed pounds, however, only a small percentage of the fish are successful in reaching the outer waters; for even though they may pass out of the bowl, they are apt to be led into it again before they succeed in running the gauntlet of both hearts.*

The pound, as described, costs about \$1,000, if we include the second set of netting, which must be used when the first is taken out to be dried and repaired. In the warm waters of this region the netting cannot remain down more than two or three weeks without being seriously injured.

* The nets are usually fished at slackwater, as at this time they are more easily lifted. As the hour of low water approaches, a boat with a crew of three or four men is rowed out from the shore to the pole P. One man at once unfastens the line that holds the bottom of the pound to its base; after which the boat is pulled to the poles G, Q, R, F, K, E, &c., until a circuit of the pound has been made and the lines that hold the bottom of the net in position have been loosened. The top of the net at C is then lowered into the water and the boat passes over it into the pound, after which the netting is again raised and fastened. The boat then proceeds to the mouth of the pound, and two men, by means of ropes attached to the lead-line at the bottom of the opening A B, raise this portion of the net entirely out of the water, placing the weighted line, which forms the lower side, over the gunwale of the boat, thus effectually cutting off all means of escape. The men then take position in either end of the boat, and gradually raise the net toward the poles P and C, driving the fish around toward G and D. This work is continued in the same manner until the fish have been driven past Q and I, when the netting is pulled up on the opposite side of the boat and the fish are thus confined in the small basin between it and the outer side of the pound. The weighted line at the bottom of A B is now thrown off, and the boat is gradually pulled towards the outer end, the basin growing constantly smaller until the fish are brought into a limited space at K, when they are at once transferred to the boat by means of dip-nets. When there is a large run of "sorap-fish," or when the catch is large, a signal is given and a flat-boat or scow is sent out from the shore to receive the surplus. It is taken to the point K on the outside of the net, and the worthless fish are thrown into it as fast as the marketable ones are sorted out. Frequently both boats are loaded and the fish are culled after reaching the shore.

After the fish have been secured the netting is thrown off, and the fishermen proceed to re-set the pound, drawing the bowl into place by means of ropes which extend from the top of the stakes through rings at their base to its lower corners and sides. The boat first proceeds to the opening A B, and after this has been properly secured it passes out of the pound and visits the different stakes in their order until all the lines have been fastened. The pound is now ready for fishing, and is left to itself until the next slackwater, while the fishermen are icing and boxing their catch.

Three or four men are required for fishing a pound-net, though by adding one or two to the force several nets are frequently tended by the same gang. The average stock for marketable fish during the season for this locality is about \$4,200 to the net; the species, named in order of value, being Spanish mackerel, tailors, trout, sheepshead, porgies, and mixed fish. If the value be neglected and the number of individuals taken be considered, the order should be changed so as to read: trout, tailors, mackerel, mixed fish, porgies, and sheepshead; in addition to the refuse fish, which are either thrown away or used for fertilizing purposes.*

On the western shore of the Chesapeake the pounds are much smaller and the catch is proportionately less, while the fishing season is also different. Here the pounds are put out in time for the run of shad, which begins early in March and continues till the last of May. After the shad season is over many of the nets are taken up. Almost none remain down throughout the summer, though a number are fished in the fall for trout and other species. On the eastern shore the law allows pounds to be fished only between the 25th of June and the 1st of October, during which time they are lifted regularly every day when the weather will permit.

3. FISHING SEASON FOR THE DIFFERENT LOCALITIES.

Owing to the enormous extent of sea-coast over which Spanish mackerel are taken and to the variation of the fishing season with the locality, these fish may be seen in the New York markets during a greater part of the year. According to the report of the Fulton Market dealers, their first appearance in 1879 occurred in April, when 98 pounds were received. The quantity gradually increased till July, during which month 114,309 pounds were handled. From this date the catch fell off rapidly until in November only 657 pounds were received, and in December but a single mackerel was seen in the market.

The fishing season for Long Island and New Jersey extends over several months; but the bulk of the catch is taken between the 20th of August and the 20th of September; and, allowing for Sundays and stormy weather, there are ordinarily only 20 good fishing days, though small quantities are taken almost every day during the stay of the fish on the coast.

In the Chesapeake the fishing season is somewhat longer, owing perhaps to the warmer temperature of the water in the early spring. It begins late in May, and is at its height from the 10th of June to the 1st of September, when the mackerel start for the ocean.

4. DISPOSITION OF THE CATCH.

Almost the entire catch of Spanish mackerel is consumed in a fresh state. A few are salted by the fishermen of North Carolina, who, owing to their ignorance of the value of the species in the Northern markets, as well as to the lack of suitable shipping facilities, seldom market their catch in a fresh state. Those salted are not considered very valuable, and the inhabitants are seldom willing to pay more than \$5 or \$6 a barrel for them, placing them on a par with the bluefish and other common species. It is doubtless true that the fine flavor of the mackerel is very much impaired by salting, and that as a salt fish it is inferior to the common mackerel (*Scomber scombrus*), with which every one is familiar.

In 1879 the cannery at Ocracoke Inlet purchased small quantities of mackerel and put them up in two-pound cans, but the business was very limited, and no extensive trade was developed,

*According to the best-informed fishermen, 100,000 trout, 40,000 bluefish, locally known as tailors, 30,000 Spanish mackerel, 10,000 mixed fish, 3,000 porgies, and 1,000 sheepshead represented the catch of the average pound for 1879. The money value of the catch was estimated as follows: Mackerel, 36 per cent.; tailors, 24 per cent.; trout, 21 per cent.; sheepshead, 6 per cent.; porgies, 5 per cent.; mixed fish, 8 per cent.

only a few hundred cans having been prepared. Recently, at the suggestion of Professor Baird, experiments were made in canning the Spanish mackerel at Cherrystone, Va., for the purpose of ascertaining their relative value as compared with other kinds of *canned fish*. The report from the canneries is to the effect that they were no better than fish of ordinary grades, though there seems to be a difference of opinion on the subject. However this may be, there is certainly no prospect of an extensive business either in the salting or canning of the species, as the demand for the fresh mackerel is sufficient to offer an outlet for all that can be secured; while the price ranges so high as to make their canning or salting entirely impracticable.

As a fresh fish, the Spanish mackerel has few equals. It is one of the most valuable species taken in the United States, and is a great favorite with epicures. The price paid for the species in the different markets is often extravagant. Instances are not uncommon where the wholesale price has exceeded \$1 per pound. The first fish sent to New York in the spring usually sell as high as 75 cents a pound, and the price does not fall far below 60 cents for some time; but as the quantity increases the price is gradually reduced, until, at times of oversupply, when the market becomes glutted, they occasionally sell as low as 6 or 7 cents a pound. The average wholesale price in New York in 1880, for all grades, is said to have been about 18 cents a pound. Mr. C. W. Smiley, who has made a careful study of the Philadelphia market, puts the average price for that city at 16½ cents per pound during the same period. The fish taken in the northern waters reach the market in much better condition than those shipped from a distance, and for this reason they sell more readily and at better figures. They are, as a rule, much larger and fatter than those taken in Chesapeake Bay; this fact alone making considerable difference in their value. While the Virginia fish are selling in New York at 15 cents, the larger ones from Sandy Hook and Long Island frequently bring more than twice as much.

Many of the fishermen of the lower Chesapeake do not ship their own fish, but sell to the dealers in Norfolk and other places at 7 to 10 cents apiece. Others pack in ice and ship directly to Baltimore by steamer, but as their facilities for packing and shipping are limited, the amount realized, after deducting the numerous expenses, is little, if any, in advance of that received by parties selling in Norfolk.

The principal markets, in their order of importance, are Baltimore, New York, Norfolk, and Philadelphia; from these points the catch is distributed to the larger cities of the country, where the fish are consumed by the wealthy classes, few going into the country towns of the interior. Few cities keep any accurate statistics of their fish trade, and for this reason it is impossible to give the quantity of mackerel handled by their dealers. No figures can be given for the Baltimore trade, though it is safe to say that the dealers of that city handle fully three-fourths of a million pounds annually. The report of the New York Fish-Mongers' Association shows that 274,913 pounds were handled in that city in 1878. This quantity, according to the same authority, was increased to 309,168 in 1879, and to 390,000 pounds in 1880. Mr. Smiley, in his report on the Philadelphia market for 1880, places the quantity of Spanish mackerel handled at 65,880 pounds, valued at \$10,870. Mr. W. A. Wilcox, secretary of the Boston Fish Bureau, estimates the quantity handled in Boston in 1879 at 15,865 pounds, while that in 1880 was about 20,000 pounds.

5. STATISTICS OF THE FISHERY.

It is not possible to state the exact quantity of Spanish mackerel taken by the fishermen of the United States during any season, but a careful study of the fisheries in the interests of the Fish Commission and Census enable us to give the following table, compiled from the preliminary statistical reports prepared by Col. Marshall McDonald, Mr. A. Howard Clark, and the writer, for

publication by the Census Office. The catch for New York is obtained from the manuscript notes of Mr. Fred Mather, while the figures for the Gulf of Mexico are gathered from data forwarded by Mr. Silas Stearns.

Table showing by States the quantity of Spanish mackerel taken in 1880, and the total catch for the United States.

State.	Pounds of mackerel taken.
Massachusetts	80
Rhode Island	2,000
Connecticut	1,200
New York	25,000
New Jersey	200,000
Maryland	18,000
Virginia	1,869,863
North Carolina	10,000
South Carolina	1,000
Eastern Florida	500
Gulf of Mexico	20,000
Total	1,887,423

From the above table it will be seen that Virginia produces 85 per cent. of all the mackerel taken, and that New Jersey fishermen catch over two-thirds of the remainder. This, as has already been remarked, is largely due to the ignorance of the fishermen of many localities, both as to the abundance of the species and to the proper methods of catching them. That the fishery will soon be extensively developed in other places seems quite certain.